

The laws governing floating bodies are touched upon, and investigation is carried so far as to cover the eminently practical and up-to-date case of the floating dock. From these considerations, the author proceeds to deal with the subject of fluids in motion, which constitutes the essential feature of the book. He makes Bernouilli's theorem his starting-point, following on to Torricelli's law and the theory of flow through mouthpieces with the coefficients due to various forms of orifice. Then, having dealt with weirs, he directs his attention to fluid flow through pipes and channels, explaining the well-known basic formula,

$$v = c \sqrt{mi},$$

and quoting the values assigned to the coefficient by Chezy, Bazin, Darcy, Ganguillet and Kutter, and others. This brings us to chapter vii., in which we find a description of the methods adopted for gauging the flow of water through an orifice, in streams and in pipes, including a brief reference to Stromeyer's suggestion for the use of a chemical agent. Chapter viii. treats of the impact of water on vanes, and thence it is a natural transition to water-wheels and turbines in chapter ix. Both this chapter and the following, on pumps, are very full and explicit, and are effectively illustrated by a number of typical examples. Chapter xi. is devoted to an exemplification of the application of hydraulic power to industrial purposes by means of various machines. In two short concluding chapters the author deals with the modern investigation of stream-line flow and the resistance to motion of bodies in water.

An admirable feature of the work is the large number of worked numerical examples. The type is clear and the illustrations are good. Altogether the work forms an excellent text-book, and is cordially to be recommended to students of this most interesting and useful science.

TECHNICAL CHEMICAL ANALYSIS.

Traite complet d'Analyse chimique appliquée aux Essais industriels. By J. Post and B. Neumann. Second French edition, by Dr. L. Gautier. Vol. i., part i. (pp. 217, price 6.50 francs). Vol. ii., part i. (pp. 202, price 6 francs). (Paris: Librairie scientifique, A Hermann, 1907-8.)

THE present review is concerned with the first two instalments of the second French edition of a German treatise on technical chemical analysis, which has already passed through three editions in the original. The complete work will consist of two volumes divided into eight sections, each section dealing with some special branch of analytical practice, and the editors have secured the cooperation of some twenty-seven eminent contributors in order that the various chapters may embody the results of the latest experience. Judging by the style of the first two sections, now before us, it would appear that the editors are aiming rather at a clear and succinct outline of contemporary analytical method, and of the general

nature of the materials to which they are applied, than at an elaborate and detailed treatise. Subject to this proviso, they may be congratulated on having so far achieved a considerable measure of success, and their efforts may be commended to British chemists who feel the need of a manual of this description.

Vol. i., part i., deals with such subjects as water, solid fuels, pyrometry, and gas analysis in a fairly complete and satisfactory manner. The opening chapter on water analysis (pp. 1-38), by Dr. H. Vogel, of Berlin, is somewhat too compressed and desultory to be of real use, and might be advantageously enlarged in future editions. Then follows an excellent *résumé* by Dr. H. Langbein of the methods in vogue for the chemical analysis and calorific valuation of solid fuels (pp. 39-73); the value of this chapter would have been enhanced by a fuller treatment of the ash analysis of coals and its importance in relation to the various uses of the raw fuel. The third chapter, by Prof. B. Neumann, of Darmstadt, on pyrometry (pp. 74-126), deals very completely with the various thermoelectrical and optical methods used in technical practice, and so far as these methods are concerned the treatment of the subject is all that could be desired. The scanty references to the air thermometer and to electrical resistance methods are, however, to be regretted.

The concluding chapter, on gas analysis (pp. 127-217), also by Prof. Neumann, is disappointing in that it deals with little else than the crude and untrustworthy methods of Hempel and Orsat (or various modifications of them), which have long been the despair of workers, who instinctively demand something both accurate and convenient, and which, we had hoped, were being rapidly discarded in technical laboratories. In these days, when the applications of gaseous fuels are increasing daily, the introduction of really accurate methods of gas analysis in technical practice is fast becoming an urgent necessity, and it is quite a mistaken notion that methods of precision are necessarily inconvenient or tedious, and therefore unsuited to the exigencies of a works laboratory. The opinion of Dreschmidt, quoted on p. 136, as to the incompleteness of the absorption of carbonic oxide by an ammoniacal solution of cuprous chloride may be disputed, since it can easily be demonstrated that a properly prepared and *fresh* solution will absorb the gas almost as rapidly, and, for all practical purposes as completely, as a caustic alkali absorbs carbon dioxide. It may also be remarked that there is no reference to gas calorimetry in this chapter.

Vol. ii., part i., dealing with the physical, mechanical, and chemical testing of limestones, mortars, cements, ceramic products, glass, and the like, has been entrusted to Drs. H. Seger and E. Cramer, of Berlin. Their treatment of the subject is admirably clear and succinct, and will certainly be appreciated by all general readers. Whilst there is nothing very new, good judgment has been exercised in selecting the best methods and appliances, and the whole is a singularly well-balanced production, and eminently readable. The one fault to be found with their work is the paucity of the references to analytical literature.

The two sections are clearly printed and admirably illustrated, but, as is unfortunately the case with the majority of chemical treatises published on the Continent, references to British work and authorities are conspicuous by their absence. W. A. B.

BRITISH ARCHÆOLOGISTS IN ITALY.

Papers of the British School at Rome. Vol. iv. Pp. x+296; illustrated. (London: Macmillan and Co., Ltd., 1907.) Price 31s. 6d. net.

THE "Papers of the British School at Rome," while similar in format, are not similar in form to the "Annals of the British School at Rome," nor can they be precisely similar in content, since the pleasure of chronicling the results of actual excavations is denied to the director of the British School at Rome. Let us always gratefully recognise the greater liberality of the Hellenic authorities and the greater tolerance of the Greek archæologists, who, while naturally and rightly desirous of keeping Greek antiquities in Greece, at the same time recognise the fact that the antiquities of classic Greece and Rome are the heritage of the whole civilised world, not of one country alone and admit that the privilege of searching for them should be freely extended to all who have the money and the will to carry out the work. Some day perhaps, the Italians will do likewise. Until then, British archæologists in Italy are confined to the contemplative life, and can do little more than write papers of the type presented in the volume under review.

The director, Mr. Thomas Ashby, most approaches the standard of the practical work of the Athens school in his very interesting paper on the "Classical Topography of the Roman Campagna," which is illustrated by good photographs, perhaps somewhat unnecessarily reproduced abroad, either in France or Italy, as the lettering beneath them shows. Probably we hardly realise how intensely hideous was the Roman style of country-house architecture, until we see such a place as Sette Bassi, which Mr. Ashby illustrates. It must have looked exactly like a warehouse, or, more probably, a piano factory. All the beauty and grace of "classical" architecture is Greek; the Romans were by nature as inclined to unredeemed utilitarian ugliness in their architecture as are the Germans or ourselves. Of the other papers, Mr. A. J. B. Wace's "Studies in Roman Historical Reliefs" is an interesting piece of critical work. Mr. Yeames, late of the British Museum, assistant director of the school, has some interesting remarks on Roman art of the post-Antonine period (first half of the third century A.D.) as exemplified in a small ivory statuette of a *gobbo* or hunchback in the British Museum.

The last paper, and in some ways the most important, is on "The Early Iron Age in South Italy," by Mr. T. E. Peet, who reaches interesting conclusions. In his preface the director says that the papers

"of Mr. Yeames and Mr. Peet, the latter especially

though still belonging to the archæological sphere, deal with departments of it which have not previously found a place in the Papers of the School."

Since to the minds of many the department of archæology represented by Mr. Peet's paper seems the most important of all, it is to be hoped that no future Papers of the School at Rome will fail to contain some contribution on the prehistoric antiquities of Italy, about which we want to know far more than we do at present. H. H.

OUR BOOK SHELF.

Armature Construction. By H. M. Hobart and A. G. Ellis. Pp. ix+348. (London: Whittaker and Co., 1907.) Price 15s. net.

THE widespread use of dynamo electric machinery for all sorts of purposes is sufficient justification, if such be required, of treatises dealing with the design and construction of such machinery. Many books have been written on this subject, but we believe this is the first time that a complete volume has been devoted to the consideration of the construction of what is, perhaps, the most important part of any dynamo, viz. the armature.

To those who know anything of this class of machinery, it will be obvious that there is ample scope for a writer with first-hand knowledge to compile an interesting and valuable book; to mention only one point, the practical construction of a good commutator is a process full of interest. The book before us will certainly repay careful study in spite of a certain lack of proportion which is very noticeable.

A very brief summary of the contents is as follows: The first seven chapters describe the various workshop processes whereby the mechanical parts of the armature are built up, that is to say, the armature stampings, the spider, and the commutator; the next two chapters are devoted to armature windings for direct-current machines and for alternators, treated diagrammatically; and the last four chapters to the methods of winding and to finishing and testing. When it is stated that 172 pages (including full-page illustrations) out of a total of about 390 are devoted to winding diagrams alone, it will be apparent that the authors have allowed their enthusiasm for such diagrams to get the better of their judgment. There is no doubt that the subject is of great interest, but in the opinion of the present writer the two lengthy chapters devoted to it are quite out of place in such a work; in so far as explanations are necessary for the proper understanding of subsequent chapters, three or four pages would be ample to furnish all that are required.

The chapters that deal with construction pure and simple are well written and illustrated, and contain a large quantity of valuable information. Chapter ii., on armature laminations, is perhaps the best in the book, and contains specifications for the composition of suitable steel; the various methods of testing the quality of the steel are described, and constants are given which may be taken as satisfactory. The process of stamping the core plates is given in detail, and is illustrated with a number of photographs of slotting presses and other tools. The other chapters are also full of interest, and, but for the error of judgment mentioned above, the whole book might be unreservedly recommended to those who from one cause or another are concerned with the practical details of armature construction.